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# **FLOOD PLAIN MANAGEMENT**

**A Study Of South Fork  
Shenandoah Tributaries**

**Rockingham County, Virginia**

**APPENDIX VI**

**HAWKSBILL CREEK**

**August 1983**

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## FOREWORD

The main report on the Flood Plain Management Study of South Fork Shenandoah River Tributaries provides information and data needed for use by administrators and the general public. Discussion of findings and recommendations relevant to the total study area are included.

Eight appendixes or technical reports include specifics on each tributary as listed below. Tables, flood profiles and area-flooded photomaps provide information for user agencies and individuals to make technical decisions and to comply with regulations related to the use of flood plains.

Appendix I	Stony Run
Appendix II	Quail Run - Boone Run
Appendix III	Cub Run - Big Run
Appendix IV	Naked Creek
Appendix V	Dry Run
Appendix VI	Hawksbill Creek
Appendix VII	Mill Creek - Congers Creek
Appendix VIII	Pleasant Run

We thank those who contributed their active interest, cooperation, and information to this project.

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Technical Report  
Hawksbill Creek

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APPENDIX VI  
South Fork Shenandoah River Tributaries  
FLOOD PLAIN MANAGEMENT STUDY  
Technical Report  
HAWKSBILL CREEK  
Rockingham County, Virginia

INTRODUCTION

This technical report on Hawksbill Creek is one of eight such appendixes to the Flood Plain Management Study on South Fork Shenandoah River Tributaries. The main report includes items such as authorities, responsibilities, scope, procedures, description, recommendations, and data common to the tributaries and relevant to the total project.

The first sections of this appendix present general information pertinent to the study on Hawksbill Creek. Included are brief discussions of natural values, alternate solutions to the flood problems, and suggested items for the flood plain management program. The last section contains data and exhibits needed to make technical decisions for regulation and use of the flood plain.

DESCRIPTION OF STUDY AREA

Upstream Drainage Area

The Hawksbill Creek drainage area comprises 15.3 square miles above its mouth at the South Fork Shenandoah River (see Figure 1). The Shenandoah River is a subbasin of the Potomac River which is in the Mid-Atlantic Region as designated by the Water Resources Council. The USGS Hydrologic Unit code number in the area is 02070005. The watershed is in the Appalachian Ridges and Valleys physiographic province. Soils in the drainage area are formed mainly in residuum of sandstone, shale, or greenstone on mountain slopes. Upland land use is about 3 percent rural residential, farmstead, and other built-up areas. The remainder includes about 92 percent woodland, 5 percent pasture, meadow and idle brushland.

Flood Plain

The study area includes the flood plain along 6.5 miles of Hawksbill Creek and 1.8 of East Hawksbill Creek. It extends from the junction at South Fork Shenandoah River up to the boundary of the Shenandoah National Park. Land use in the flood plain is about 27 percent pasture, hay and meadow, 2 percent cropland, 20 percent idle brushland, 50 percent woods and 1 percent miscellaneous. About 24 bridges, dwellings, farm buildings and other structures would be subject to varying amounts of damage during extreme floods.

## Natural and Beneficial Flood Plain Values

Hawksbill Creek supports native or 'put and take' trout populations, primarily in the headwaters. This stream is mostly in wooded cover which provides good habitat for fish and wildlife populations. Practices that maintain this forest cover would be the best way to preserve this high natural value.

## FLOOD HISTORY

Flooding on Hawksbill Creek usually results from intense thunderstorm activity. Excess rainfall concentrates quickly on the steep slopes; flood stages rise rapidly and fall just as quickly. Limited flooding and damage may occur several times each year. On average, moderately severe damages are experienced at three to five year intervals. No records or recollections were noted on unusually severe floods on Hawksbill Creek. Average annual flood damages were estimated at about \$50,000.

## FLOOD POTENTIAL

### Present Conditions

Extreme floods would inundate about 270 acres of primarily agricultural land (see Table below). Extensive damage would be done to the land, crops, fences, farm roads, buildings and machinery. Less extensive but more critical damage would accrue to dwellings and businesses. Velocities in the flood plain would average about four feet per second and exceed seven feet per second in some reaches. Out-of-bank stages would range from about one and a half to nine feet. Duration of flooding would seldom exceed six hours except during storms of intense and prolonged rainfall. Figure 1 and Figure 2 show potential flood stages.

The acres tabulated below are used primarily for pasture and other agricultural uses. Only about five percent is occupied by structure sites, but varying amounts of damage would occur to 15 dwellings, 6 farm buildings, and 3 bridges.

<u>Type of Damage</u>	<u>Acres Inundated</u>	
	<u>100-year flood</u>	<u>500-year flood</u>
Agricultural	214	227
Miscellaneous	<u>57</u>	<u>60</u>
TOTAL	271	287

Limitations on Use of Data. The flood elevations given in this report should be considered as minimum elevations. During floods, uprooted trees and other debris may collect on bridges and culverts and clog the channels. Such obstructions increase the depth and extent of flooding. Analyses were made without showing the effects of potential obstructions. Also, extremely rare events such as dam failure and climatic changes were not analyzed.

#### Future Conditions

The hydrologic conditions in the upstream areas are expected to improve as farmers and foresters continue to apply good management and conservation practices. This improvement is expected to reduce runoff approximately to the extent that additional development will increase runoff. Therefore, the flood hazard and damage potential is not expected to change significantly in the next 10 to 15 years.

### FLOOD PLAIN MANAGEMENT

The main report includes a discussion of existing programs, current regulations, availability of flood insurance, recommendations, and related items relevant to the total study. The items discussed below relate only to Hawksbill Creek.

Floodway. The data for a "first trial" or computed floodway is filed with the basic data for Hawksbill Creek. The results indicate that hazardous conditions of depth and/or velocity prevail at current 100-year flood levels in all reaches, and that generally no additional encroachment should be allowed. The data can be used as a basis for further study of local measures, but it is suggested that no continuous or extensive floodway be considered.

#### Recommendations

In preparation of their comprehensive flood management program, the local sponsors should implement the following recommendations on Hawksbill Creek.

- Discourage future developments in the flood plain and assure that regulations are followed so as not to increase the flood hazard;
- Assist landowners in studies of local protection measures to reduce streambank erosion and the spread of floodwaters; and
- Encourage the re-establishment of natural vegetation in the flood plain to restore the fish and wildlife habitat.

#### Evaluation of Potential

The potential for reducing the flood hazard on Hawksbill Creek is limited by the relatively low value of damages from flooding compared to the cost of flood protection. Also it is very difficult to provide protection for houses located right on the stream bank.



There is a significant danger of loss of life in the lower reaches of Hawksbill Creek, but there is little that can be done except for relocation of houses.

Hydrologic conditions under current land use and management practices are generally good to excellent. An improved conservation use-and-land treatment only program would provide only limited reductions in runoff and flood stages.

The primary opportunities have to do with relocation of existing structures, prohibition of future construction or other encroachment in the flood plains and with other regulations needed to avoid increased runoff and to minimize flood damages.

### TECHNICAL DATA AND EXHIBITS

This section provides the data and exhibits needed by user agencies and individuals to make technical decisions and to comply with regulations on use of the flood plain on Hawksbill Creek.

The index map shows the area covered by the individual photomaps. Flood hazard photomaps show the area inundated by the 100 and 500-year floods. Where only one line is shown, there is no significant difference in the boundaries of the two flood areas. These photomaps should only be used to determine approximate flood elevations; they are based on semicontrolled mosaics and the boundaries shown may vary from the location on the ground.

Flood profile plates provide elevations of the 10, 50, 100 and 500-year floods at any location along the length of the streams. The elevations and discharges of the 10, 25, 50, 100 and 500-year flood at each surveyed cross section are given in Table HC-1. Sample cross sections illustrated how the flood area boundaries were located. Table HC-2 provides the description and elevation of benchmarks which are located on the photomaps.

Table HC-1 can be used to locate flood elevations on the ground at surveyed cross sections.

The photomaps, flood profiles and bench mark data can be used to locate flood elevations between surveyed cross sections, as follows:

1. On the appropriate photomap find the point on the stream where the flood line is to be located; then scale the distance along the stream to the nearest cross section.
2. On the appropriate flood profile sheet, scale the distance determined in Step 1 from the cross section back to the original stream location, and read the elevation of the desired flood frequency line.

3. Transfer the elevation determined in Step 2 to the ground from the nearest established benchmark.

A glossary, bibliography and discussion of technical procedures are included in the main report for this study. The basic data is on file in the office of the USDA Soil Conservation Service, Richmond, Virginia 23240.



78° 45' 00"

78° 30' 00" 38° 30' 00"

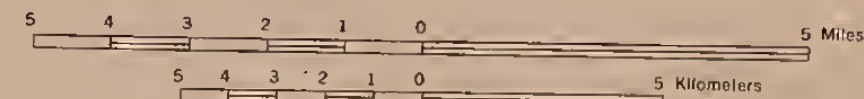


VIRGINIA



# INDEX TO PHOTOMAP SHEET COVERAGE SOUTH FORK SHENANDOAH RIVER TRIBUTARIES

PAGE COUNTY AND ROCKINGHAM COUNTY, VIRGINIA



## LEGEND

- Stream channel
- Sheet coverage

AUGUSTA CO

79° 00' 00"

38° 15' 00"

78° 45' 00"

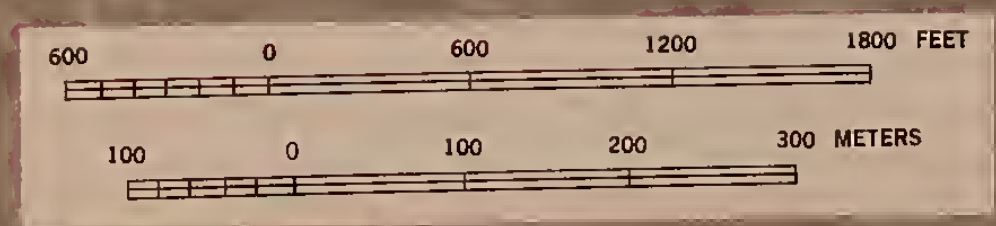
Source: SCS county base checked to USGS quads





SOURCE: Semi-controlled mosaic prepared from  
USDA-ASCS Aerial photography flown 1974

USDA-SCS-FORT WORTH, TEXAS 1983



LEGEND

- Stream channel
- 500 year flood area
- 100 year flood area
- Stream miles
- 12 Surveved cross section's
- X BM 17 Bench mark

NOTE: When only one line and color is shown  
the 100 and 500 year flood areas  
are the same.





SOURCE: Semi-controlled mosaic prepared from  
USDA-ASCS Aerial photos flown 1/4  
USDA-SCS FORT WORTH, TEXAS 1993

PHOTO MAP HB 2

HAWKSBILL CREEK

U.S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE  
SOUTH FORK SHENANDOAH RIVER TRIBUTARIES  
FLOOD PLAIN MANAGEMENT STUDY  
ROCKINGHAM COUNTY, VIRGINIA

SHEET 2 OF 4







SOURCE Semi-controlled mosaic prepared from  
USDA ASCS Aerial photography flown 1974

USDA-SCS-FORT WORTH, TEXAS 1983

PHOTO MAP HB 3

HAWKSBILL CREEK

U.S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE  
SOUTH FORK SHENANDOAH RIVER TRIBUTARIES  
FLOOD PLAIN MANAGEMENT STUDY  
ROCKINGHAM COUNTY, VIRGINIA

SHEET 3 OF 4





SOURCE: Semi-controlled mosaic prepared from  
USDA-ASCS Aerial photography flown 1974

USDA-SCS-FORT WORTH, TEXAS 1983





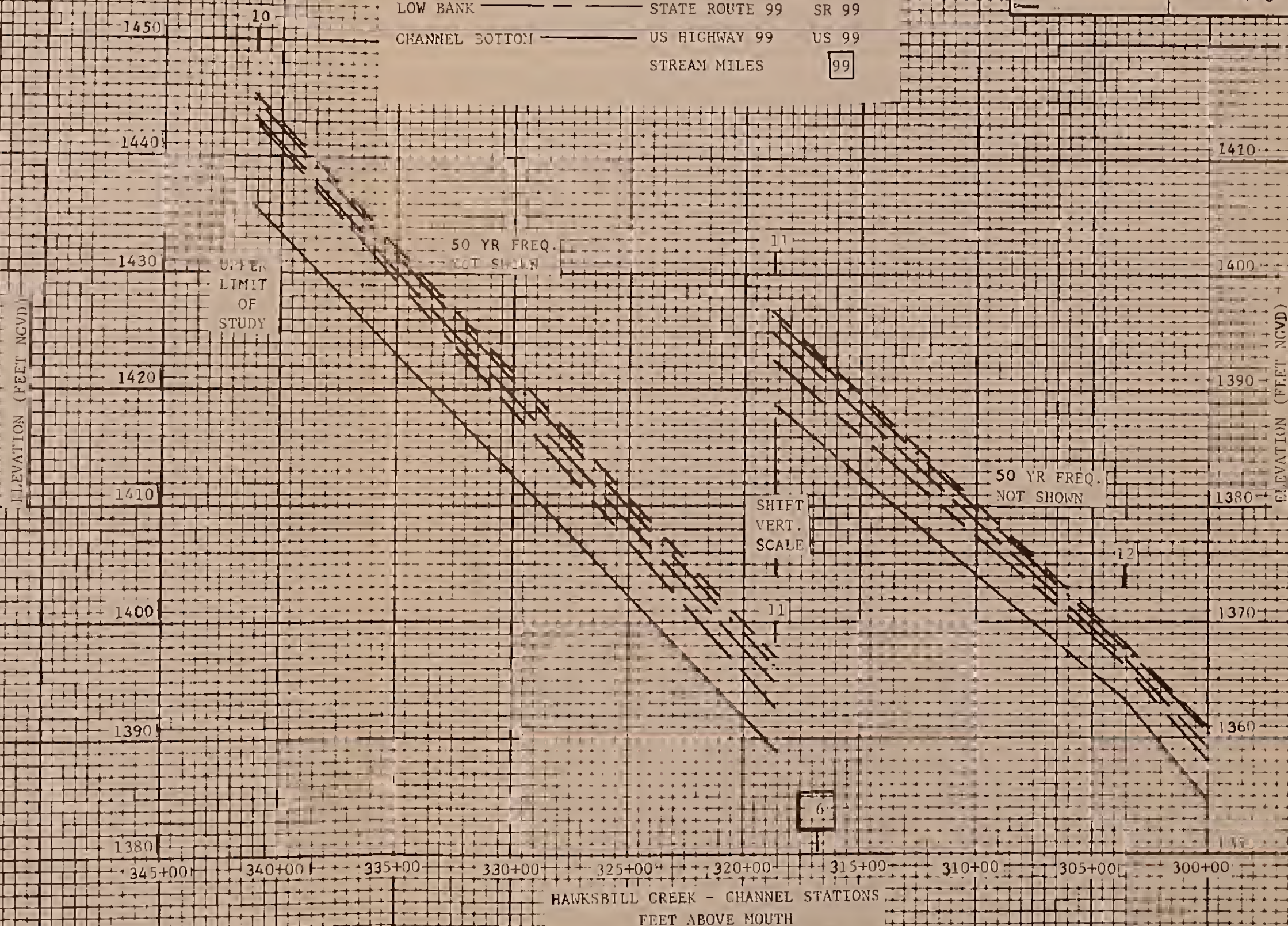
FLOOD PROFILES  
HAWKSBILL CREEK  
ROCKINGHAM COUNTY, VA.

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Designed: MAM 8/80  
Date: 8/80  
Plate 1 of 7  
See Photomaps 2

LEGEND

500 YR	— — — — —	SURVEYED X-SECTION	99
100 YR	- - - - -	ELEV-BRIDGE DECK	I
50 YR	- - - - -	ELEV-LOW BEAM	I
10 YR	- - - - -	ELEV-LOW ROAD	—
LOW BANK	- - - - -	STATE ROUTE 99	SR 99
CHANNEL BOTTOM	- - - - -	US HIGHWAY 99	US 99
		STREAM MILES	99

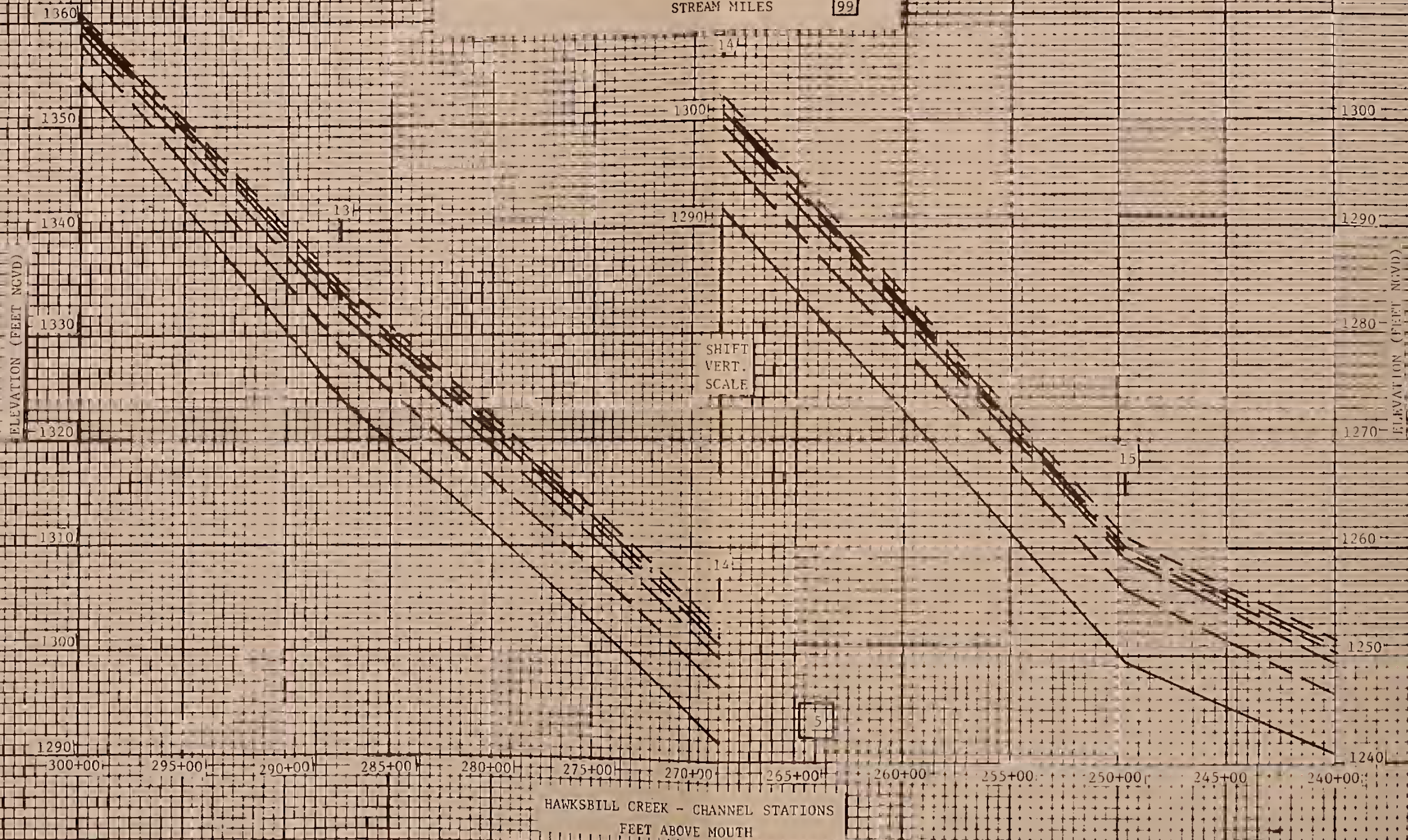




FLOOD PROFILES  
 HAWKSBILL CREEK  
 ROCKINGHAM COUNTY, VA.  
 U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Designed by MAM 8/80  
 Drawn by  
 Traced by  
 Checked by  
 Plate 2 of 7  
 See  
 Photomap 2

- LEGEND
- 500 YR ——— SURVEYED X-SECTION 99
  - 100 YR - - - - - ELEV-BRIDGE DECK I
  - 50 YR ——— ELEV-LOW BEAM
  - 10 YR ——— ELEV-LOW ROAD
  - LOW BANK ——— STATE ROUTE 99 SR 99
  - CHANNEL BOTTOM ——— US HIGHWAY 99 US 99
  - STREAM MILES 99





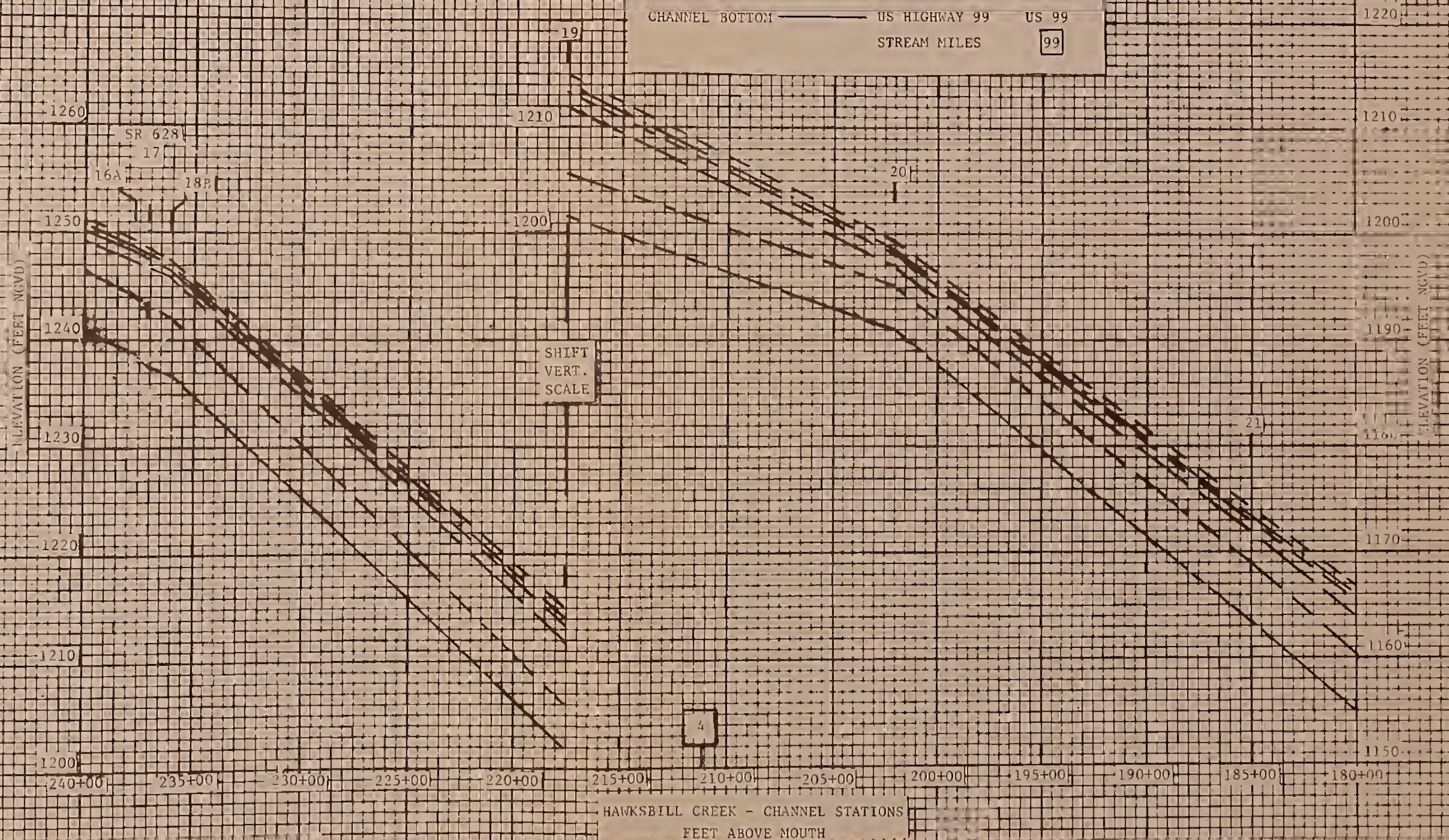
**FLOOD PROFILES  
HAWKSBILL CREEK  
ROCKINGHAM COUNTY, VA.**

**U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE**

MA 8/80 Plate 3 of 7  
See  
Photomap 2

**LEGEND**

500 YR	— — — — —	SURVEYED X-SECTION	99
100 YR	- - - - -	ELEV-BRIDGE DECK	I
50 YR	- - - - -	ELEV-LOW BEAM	I
10 YR	- - - - -	ELEV-LOW ROAD	—
LOW BANK	- - - - -	STATE ROUTE 99	SR 99
CHANNEL BOTTOM	- - - - -	US HIGHWAY 99	US 99
		STREAM MILES	99





FLOOD PROFILES  
HAWKSBILL CREEK  
ROCKINGHAM COUNTY, VA.  
U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Plate 4 of 7

MAM 8/80

See  
Photomap 3

LEGEND

500 YR	— — — — —	SURVEYED X-SECTION	99
100 YR	· — — — ·	ELEV-BRIDGE DECK	I
50 YR	— — — — —	ELEV-LOW BEAM	—
10 YR	— — — — —	ELEV-LOW ROAD	—
LOW BANK	— — — — —	STATE ROUTE 99	SR 99
CHANNEL BOTTOM	— — — — —	US HIGHWAY 99	US 99
		STREAM MILES	99

SHIFT  
VERT.  
SCALE

1180

1170

1160

1150

1140

1130

180+00

175+00

170+00

165+00

160+00

155+00

150+00

145+00

140+00

135+00

130+00

125+00

120+00

1140

1130

1120

1110

1100

1090

1080

1070

22

23

3

HAWKSBILL CREEK - CHANNEL STATIONS  
FEET ABOVE MOUTH

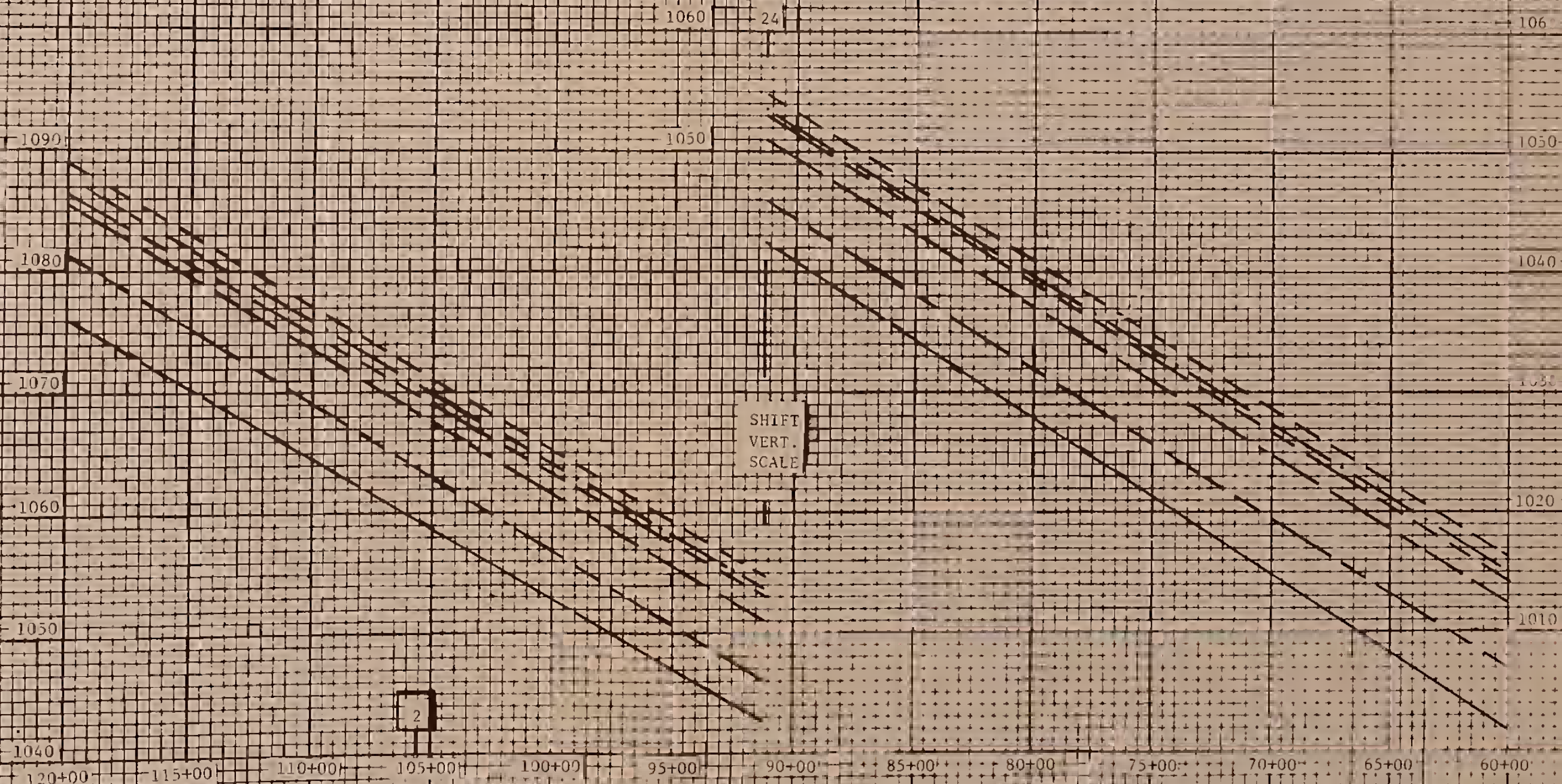


LEGEND

500 YR ————— SURVEYED X-SECTION 99  
 100 YR - - - - - ELEV-BRIDGE DECK  
 50 YR - - - - - ELEV-LOW BEAM  
 10 YR ————— ELEV-LOW ROAD  
 LOW BANK ————— STATE ROUTE 99 SR 99  
 CHANNEL BOTTOM ————— US HIGHWAY 99 US 99  
 STREAM MILES 99

ELEVATION (FEET NGVD)

ELEVATION (FEET NGVD)



HAWKSBILL CREEK - CHANNEL STATIONS  
 FEET ABOVE MOUTH



# FLOOD PROFILES

## HAWKSBILL CREEK

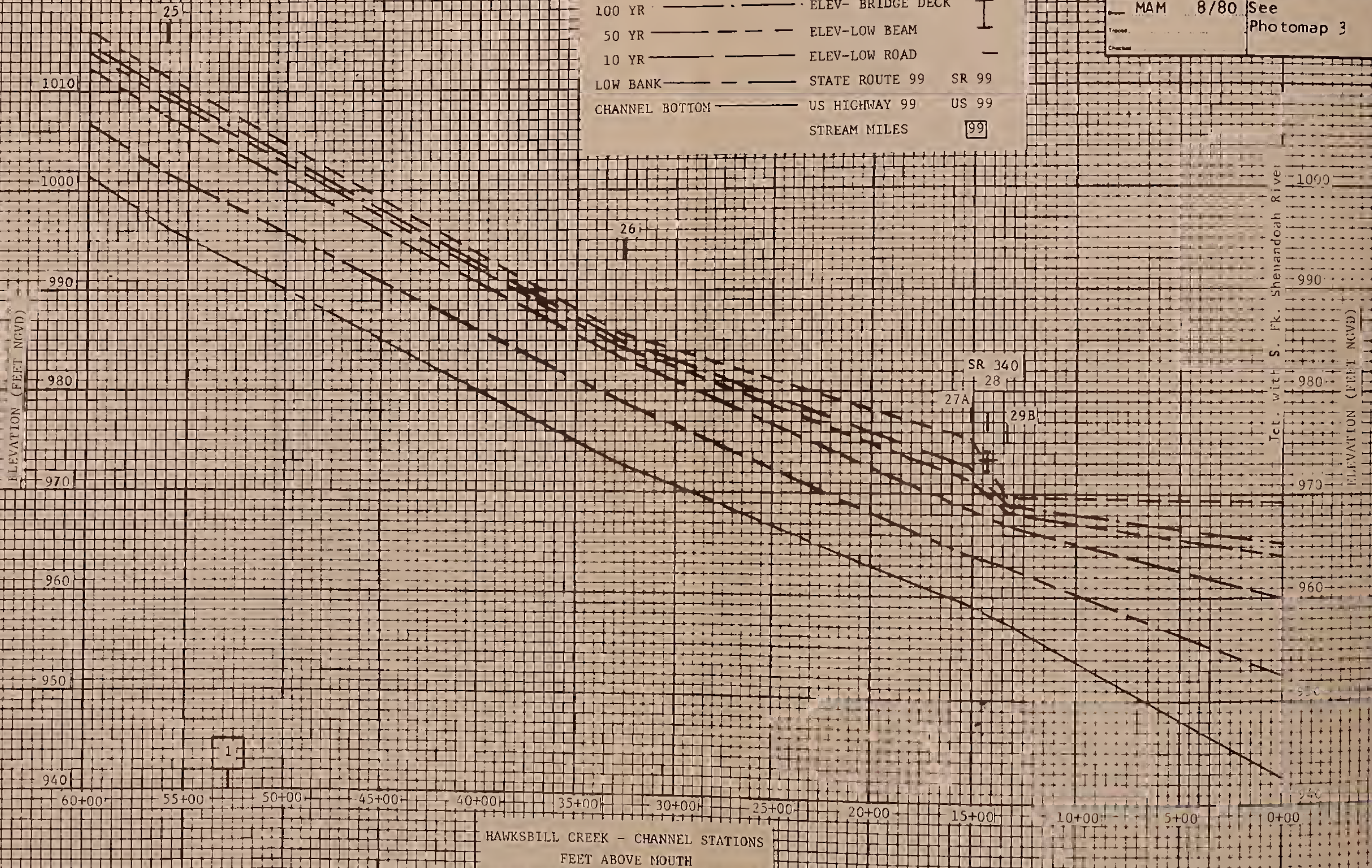
ROCKINGHAM COUNTY, VA.  
U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Plate 6 of 7

MAM 8/80 See  
Photomap 3

### LEGEND

500 YR	-----	SURVEYED X-SECTION	99
100 YR	-----	ELEV- BRIDGE DECK	I
50 YR	-----	ELEV-LOW BEAM	I
10 YR	-----	ELEV-LOW ROAD	---
LOW BANK	-----	STATE ROUTE 99	SR 99
CHANNEL BOTTOM	-----	US HIGHWAY 99	US 99
		STREAM MILES	[99]





# LEGEND

500 YR ——— SURVEYED X-SECTION 99  
 100 YR ——— ELEV-BRIDGE DECK  
 50 YR ——— ELEV-LOW BEAM  
 10 YR ——— ELEV-LOW ROAD  
 LOW BANK ——— STATE ROUTE 99 SR 99  
 CHANNEL BOTTOM ——— US HIGHWAY 99 US 99  
 STREAM MILES 99

## FLOOD PROFILES

EAST HAWKSBILL CREEK  
 ROCKINGHAM COUNTY, VA.

U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

MAM 8/80 Plate 7 of 7  
 See Photomaps 4 & 2

UPPER  
 LIMIT  
 OF  
 STUDY

ELEVATION (FEET NGVD)

1450  
 1440  
 1430  
 1420  
 1410  
 1400  
 1390  
 1380  
 1370

10 YR  
 50 YR  
 100 YR  
 Omitted

411

1390

42

43

41

1380

50 YR  
 100 YR  
 Omitted

50 YR  
 Omitted

50 YR  
 Omitted

SHIFT  
 VERT.  
 SCALE

1370

1330

1290

1240

SHIFT  
 VERT.  
 SCALE

411

1350

1310

1270

1220

SHIFT  
 VERT.  
 SCALE

43

1380

1340

1300

1260

1210

1

1370

90+00

80+00

70+00

60+00

50+00

40+00

30+00

20+00

10+00

0+00

HAWKSBILL CREEK - CHANNEL STATIONS  
 FEET ABOVE MOUTH

45A

46 SR628

47B

SHIFT  
 VERT.  
 SCALE

1250

SHIFT  
 VERT.  
 SCALE

1240

44

45A

Let. Hawksbill Cr.

ELEVATION (FEET NGVD)

1200

1190

1180

1170

1160

1150

1140

1130







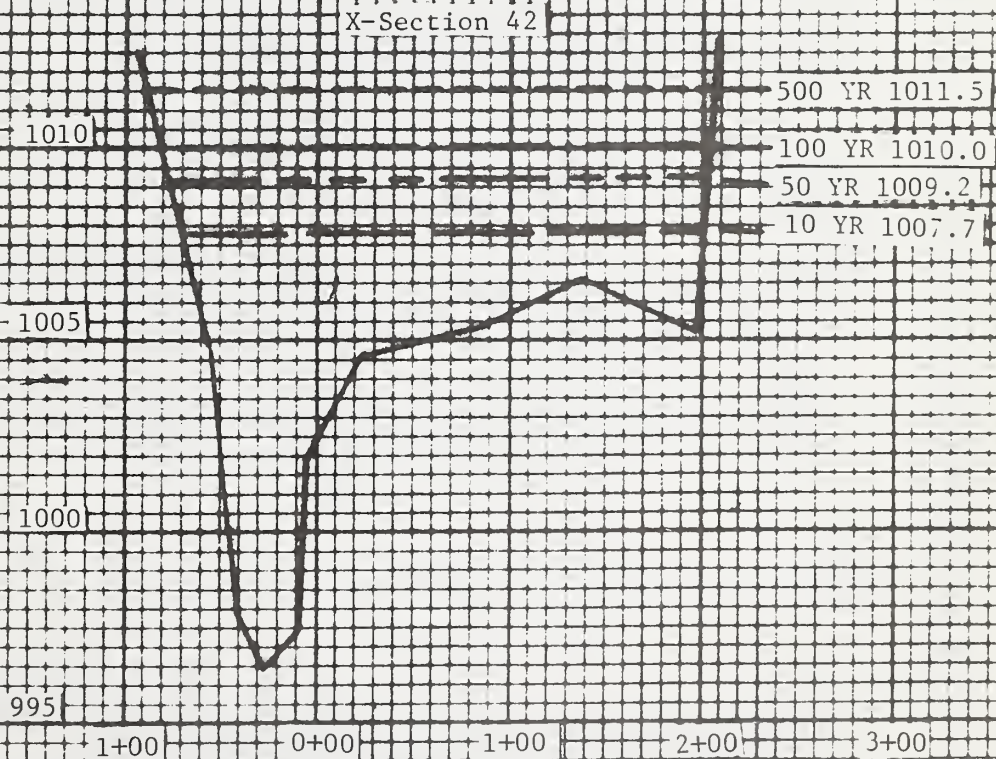
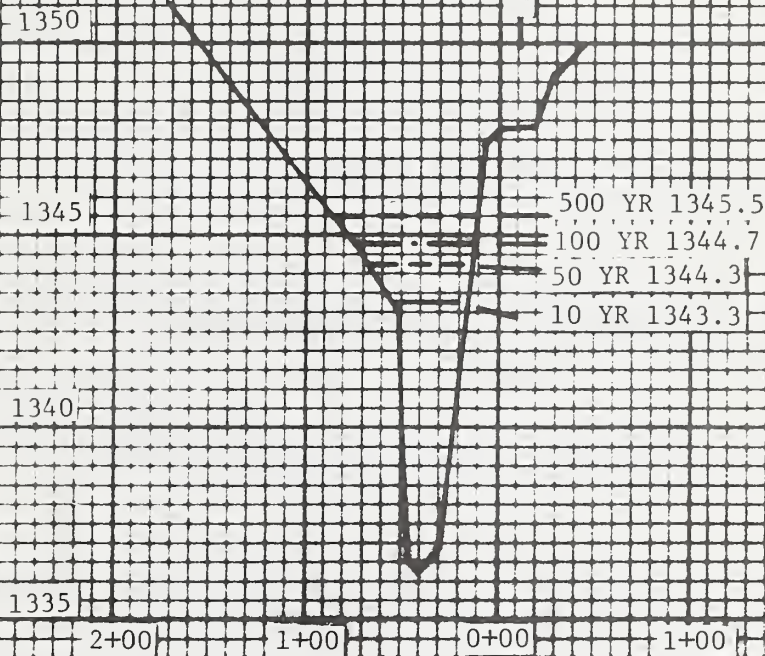
# TYPICAL CROSS SECTIONS

HAWKSBILL CREEK

ROCKINGHAM COUNTY, VA.

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Designated	Base
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X-Section 25

Table HB-1 Frequency-discharge-elevations, Hawksbill Creek  
South Fork Shenandoah River Tributaries, Rockingham County, Virginia

Profile		10-year		25-year		50-year		100-year		500-year			
Photomap	Plate	DA	Disch.	Elev.	Disch.	Elev.	Disch.	Elev.	Disch.	Elev.	Disch.	Elev.	
X-Sec.	No.	(sq mi.)	(cfs)	(ngvd)	(cfs)	(ngvd)	(cfs)	(ngvd)	(cfs)	(ngvd)	(cfs)	(ngvd)	
Hawksbill Creek - Upper Limit of Study													
HB10	HB1	1	2.70	1500	1443.1	2150	1444.0	2620	1444.8	3220	1445.0	4130	1445.4
HB11	HB1	1	3.92	2075	1395.0	2770	1395.5	3350	1395.9	4080	1396.2	5300	1396.9
HB12	HB1	1	4.08	2125	1367.0	2790	1367.2	3440	1367.5	4100	1367.9	5440	1368.1
HB13	HB2	2	4.59	2340	1332.0	3040	1333.0	3740	1333.3	4480	1334.0	5950	1334.9
HB14	HB2	2	4.86	2450	1299.8	3170	1300.2	3910	1300.9	4670	1301.2	6300	1302.2
HB15	HB2	2	5.42	2660	1259.0	3410	1259.2	4200	1259.8	5000	1260.0	6610	1261.0
HB16A	HB2	3	5.53	2710	1247.1	3460	1247.9	4250	1248.2	5020	1248.8	6700	1249.2
HB17		5.54	State Route 628 Low Road 1243.0 Low steel 1242.0 Bridge deck 1243.4										
HB18B	HB2	3	5.55	2715	1245.9	3465	1246.1	4260	1246.7	5030	1247.0	6710	1247.6
HB19	HB2	3	5.79	2760	1212.0	3570	1212.0	4345	1213.2	5180	1214.0	6890	1215.0
HB20	HB2	3	7.90	3590	1197.0	4650	1197.8	5740	1198.1	6800	1198.7	9200	1199.5
HB21	HB2	3	9.12	4010	1172.0	5300	1172.5	6600	1173.0	7800	1173.4	10500	1174.1
HB22	HB3	4	12.78	6280	1046.5	8200	1047.9	10170	1048.2	12160	1049.0	16270	1050.4
HB23	HB3	4	13.68	6520	1094.1	8500	1094.9	10660	1095.5	12750	1096.0	17000	1097.2
HB24	HB3	5	14.29	6790	1051.0	8800	1052.0	11000	1053.0	13000	1053.7	17500	1054.9
HB25	HB3	6	14.85	6980	1007.7	9100	1008.6	11300	1009.2	13330	1010.0	17840	1011.5
HB26	HB3	6	15.07	6980	983.1	9120	983.9	11320	984.2	13490	984.9	17900	985.7
HB27A	HB3	6	15.25	6980	968.4	9140	969.9	11340	971.2	13550	972.7	18000	975.3
HB28		15.26	State Route 340 Low Road 973.30 Low Steel 972.1 Bridge Deck 974.1										
HB29B	HB3	6	15.29	6980	967.0	9150	967.5	11350	968.1	13590	968.9	18180	969.8
Jct. South													
Ek. Shen		15.29		960.0		962.5		964.2		965.3		969.8	



Table HB-1 Frequency-discharge-elevations, East Hawksbill Creek  
South Fork Shenandoah River Tributaries, Rockingham County, Virginia - Continued

X-Sec.	Profile		10-year			25-year			50-year			100-year			500-year		
	Photomap No.	Plate No.	DA (sq mi)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)		
East Hawksbill Creek ~ Upper Limit of Study																	
EHB40	EHB4	7	1.13	920	1455.1	1230	1455.7	1390	1456.0	1700	1456.6	2250	1457.0				
EHB41	EHB4	7	2.64	1900	1413.0	2450	1413.9	2900	1414.4	3550	1414.9	4600	1415.6				
EHB411	EHB4	7	2.75	1960	1385.9	2560	1386.4	3020	1386.6	3700	1387.1	4830	1387.7				
EHB42	EHB4	7	2.88	2020	1343.3	2650	1343.8	3150	1344.3	3850	1344.7	5000	1345.5				
EHB43	EHB4	7	3.01	2100	1300.2	2750	1300.9	3290	1301.1	3990	1301.5	5230	1302.2				
EHB44	EHB4	7	3.22	2220	1263.6	2900	1264.3	3450	1264.5	4190	1265.0	5500	1265.7				
EHB45A	EHB4	7	3.39	2300	1210.7	3000	1211.4	3580	1212.0	4350	1212.8	5700	1214.0				
EHB46			3.40	State Route 628	Low Road 1207.1	Low steel 1206.6	Bridge deck 1207.9										
EHB47B	EHB4	7	3.41	2310	1206.9	3020	1207.7	3620	1208.2	4400	1208.7	5750	1209.9				
Jct. Hawks- bill Cr. HB2		7	3.53		1148.0		1149.0		1149.7		1150.2		1151.7				

Table HB-2

<u>B.M.</u>	<u>Photo Map No.</u>	<u>Bench Mark Descriptions and Elevations Hawksbill Creek</u>
13	4	SCS TBM - A square is chiseled on the upstream southwest abutment of private bridge over the East Hawksbill Creek to G. W. Baugher Property. Elevation - 1385.26
17	1	SCS TBM - A SCS disk on base of Telephone Pole No. 1 at X-sect-11. Elevation - 1409.08
22	2	SCS TBM - A square is chiseled on the upstream northeast abutment of bridge over the Hawksbill Creek on S.R. 628 approximately 700 feet northeast of a Mennonite church. Elevation - 1243.40
24	4	SCS TBM - A square is chiseled on the downstream north west abutment of bridge over the East Hawksbill Creek on S.R. 628. Elevation - 1207.89
30	3	SCS TBM - A SCS disk is in base of Power Pole No. WD 68 approximately 140 feet north east of low water bridge at 1st crossing above Highway 340. Elevation 981.18

Note: Elevation in feet above National Geodetic Vertical Datum of 1929.



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